

Total Maximum Daily Load (TMDL) Development to Address Water Quality Impairments in Roses Creek

**Technical Advisory Committee Meeting
April 4, 2003**





DEQ Introduction

- **Piedmont Regional Office (Discussion of TMDLs and Roses Creek watershed)**
- **Berger/GMU (Technical approach for TMDL Development)**
- **Questions**

A scenic view of a river flowing through a lush green landscape. The river is in the middle ground, with white water rapids visible. The banks are covered in dense green grass and trees. In the background, there are more trees and a few buildings visible through the foliage. The sky is overcast.

The what, why, and how behind Total Maximum Daily Loads (TMDLs)



Overview

- **What is a TMDL?**
- **Why are TMDLs needed?**
- **How are TMDLs developed?**
- **What kinds of TMDLs are currently being developed?**
- **What are the impaired segments?**
- **How can stakeholders (you) be involved?**

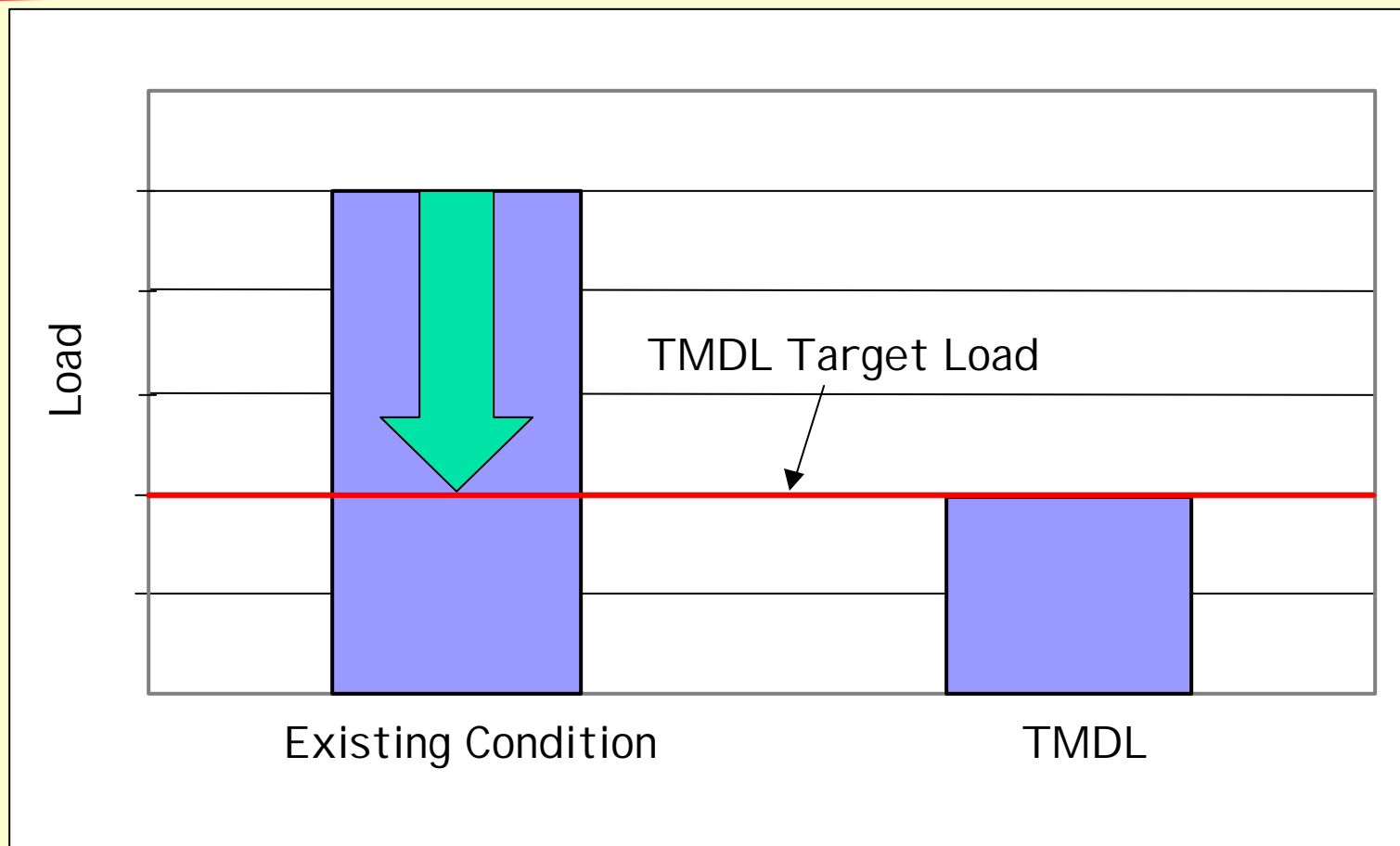


What is a TMDL?

TMDL = TOTAL MAXIMUM DAILY LOAD

- **Amount of pollution a water body can receive without negatively affecting its beneficial uses.**
 - - aquatic life, fishing, shellfishing, swimming, drinking water
- **The TMDL budget includes all forms of pollution**
 - point sources
 - non-point sources
 - natural background sources

Example TMDL



Reducing load in the impaired watershed to the target TMDL load is expected to restore water quality



Overview

- What is a TMDL?
- **Why are TMDLs needed?**



Why are TMDLs needed?

“The primary mission of the TMDL program is to protect public health and the health of impaired aquatic ecosystems by ensuring attainment of water quality standards, including beneficial uses.” (US EPA, 1998)



Legal basis for TMDL program

- **1972 Clean Water Act (CWA) &/or 1997 Water Quality Monitoring, Information and Restoration Act (WQMIRA)**
 - **Water quality monitoring**
 - **Periodic assessments**
 - **Listing of impaired waters**
 - **TMDL development for impaired waters**
 - **Implementation plans**



Overview

- What is a TMDL?
- Why are TMDLs needed?
- **How are TMDLs developed?**



Required Elements of a TMDL

- Be developed to meet water quality standards;
- Be developed for critical stream conditions;
- Consider seasonal variations;
- Include wasteload and load allocations;
- Include a margin of safety (explicit or implicit);
- Consider impacts of background contributions;
- Be subjected to public participation; and
- Have reasonable assurance for implementation.



What is the TMDL development process?

- **Characterize the watershed**
 - Gather and synthesize data
 - Involve stakeholders (you) in verifying existing data and collecting additional data
 - Use computer models to develop TMDL
- **Conduct initial public meeting (30 day comment period)**
- **Develop draft TMDL**
- **Conduct final public meeting and release draft TMDL (30 day comment period)**
- **Route TMDL through the Approval Process**



Steps After TMDL Development

- **EPA approval no later than June 1, 2004**
- **TMDL adopted by State Water Control Board**
- **Implementation Plan development: currently developing guidance with DCR**
- **Implementation (voluntary for non-permitted activities) and follow-up monitoring**
- **Ongoing opportunities for public input and participation**



TMDL Implementation

- **Implementation plans not required under CWA or by EPA's current regulations.**
- **DEQ is required by state legislation to develop implementation plan**
- **DCR has lead role in NPS implementation plans**
- **DEQ and DCR are developing framework for NPS TMDL implementation plans**



Staged Implementation

- **TMDLs include staged reduction targets**
 - **allows most cost-effective measures to be implemented first**
 - **allows iterative evaluation of TMDL adequacy in achieving water quality standard**
 - **last stage may require review/change of WQS**



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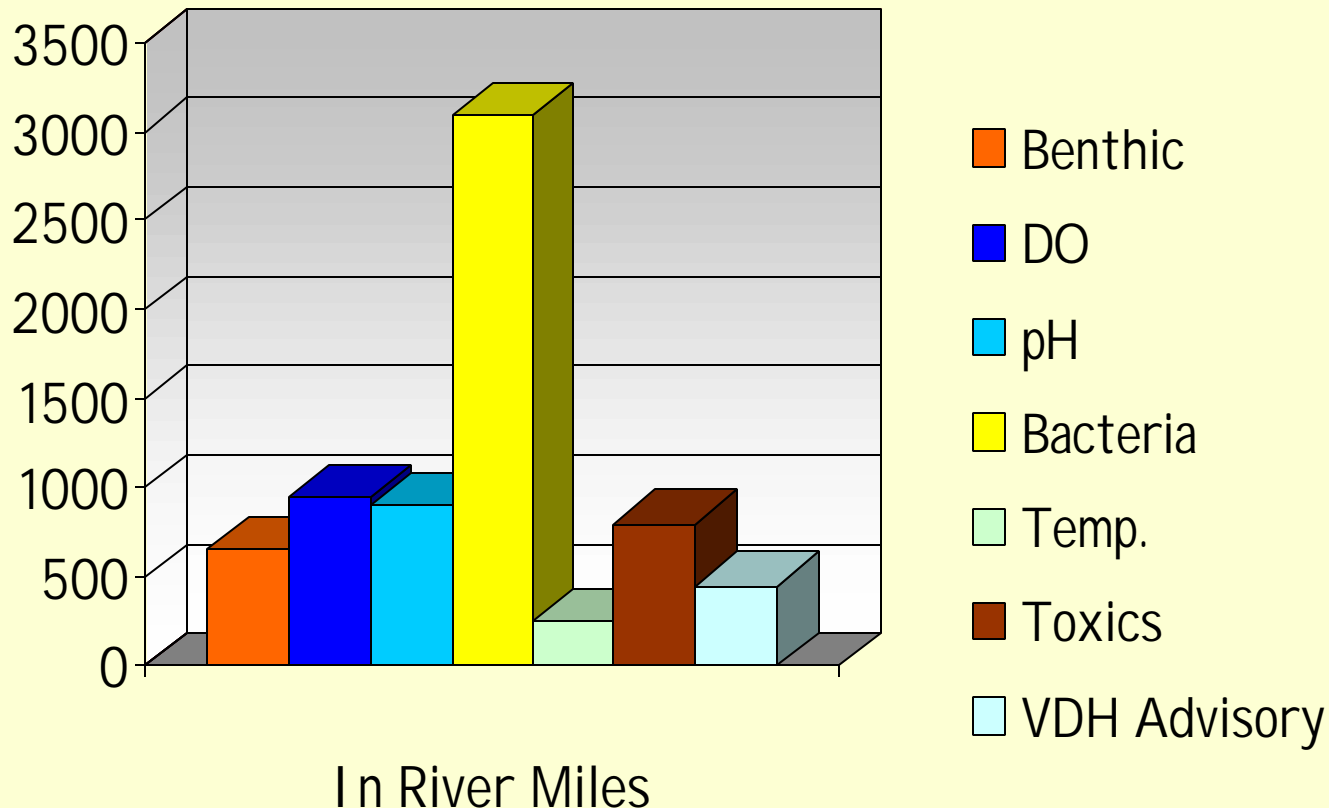


Water Quality Standards

- **TMDL developed for streams that don't meet water quality standards**
- **Purpose of Standards is the protection of 5 designated uses:**
 - Aquatic Life
 - Fish consumption
 - Public water supply
 - Shellfishing
 - Swimming

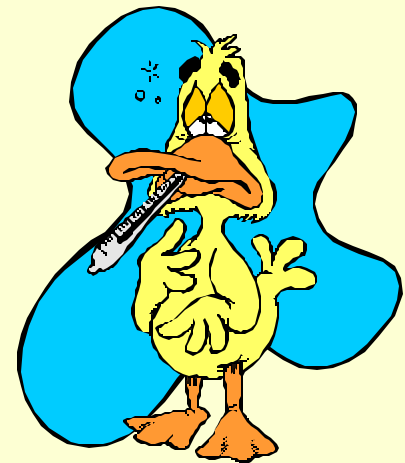
Top Sources of Water Quality Impairment

Top Causes of Impairments
on Streams & Rivers in Virginia



What are fecal bacteria?

- Bacteria present in the intestines of warm blooded animals, e.g. human, livestock, wildlife, and birds
- Indicator of the potential presence of pathogens in water bodies.





Water Quality Standards: Bacteria Impairment

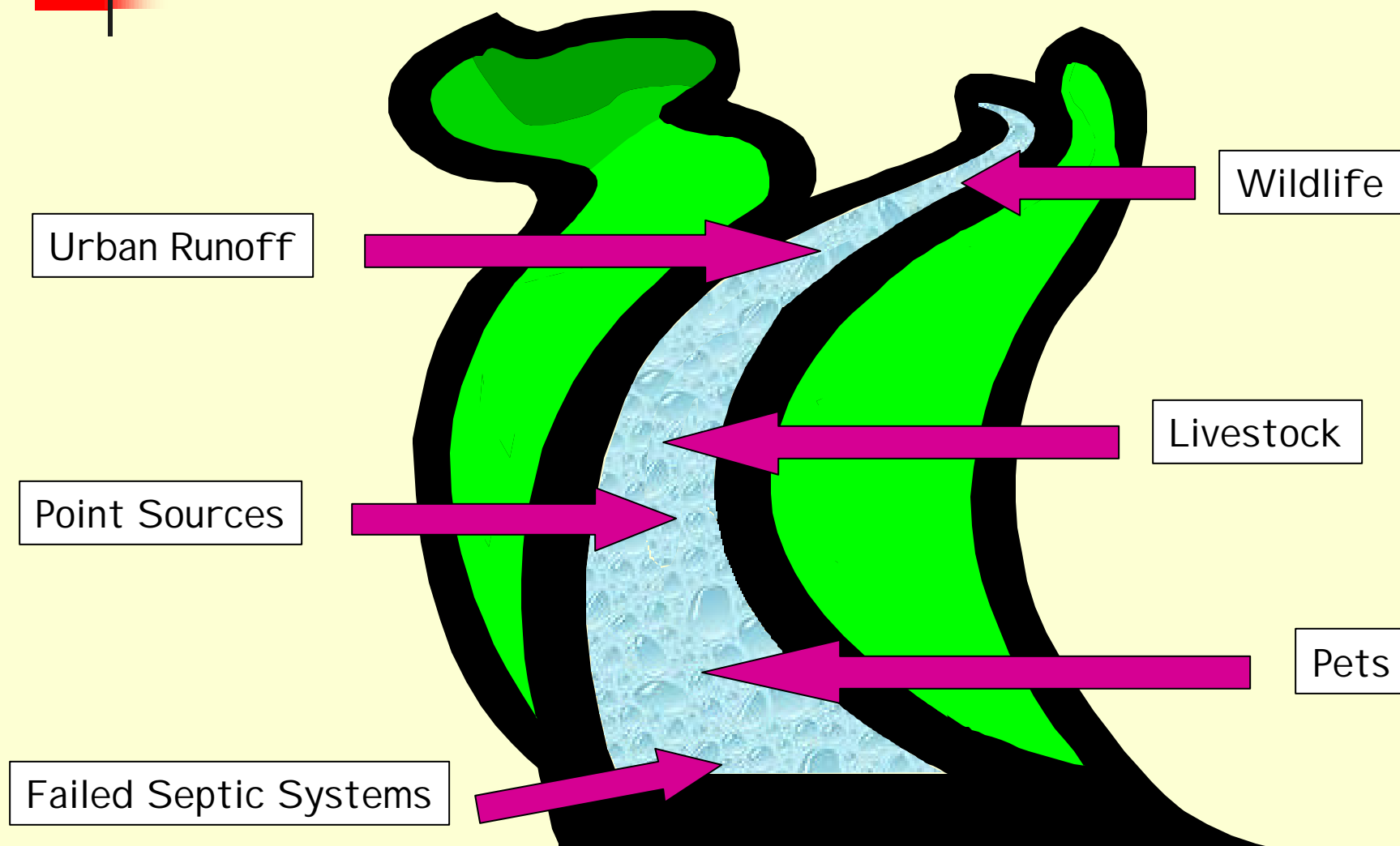
- **The Primary Contact Recreation designated use is not met due to violations of the water quality standard for bacteria**
 - Listed as impaired if more than 10% of samples exceed the criteria
 - Indicator was Fecal Coliform, as of January 15, 2003 E. coli is new indicator
 - Virginia and EPA have agreed on translator for TMDL model development



E. coli Criteria

- **All Roses Creek bacteria TMDLs will be developed for E. coli using FC model and in-stream translator**
- **Single sample max: 235 counts/100mL**
 - **applies for all samples collected**
- **Geometric mean: 126 counts/100mL**
 - **applies for two or more samples taken during any calendar month**

Potential sources of fecal bacteria





Water Quality Standard: Benthic Impairment

- **The aquatic life use is not met due to violations of the General Standard:**
 - “All state waters shall be free from substances [...] which are harmful to human, animal, plant or aquatic life.” (9 VAC 25-260-20)
- **Support of the aquatic life use is determined, in part, based on the biological assessment of the benthic community (= visible critters that live on the stream bed)**



What are benthic macroinvertebrates?

- **Stream-Inhabiting Organisms**
 - **Benthic: Bottom dwelling**
 - **Macro: Large enough to see**
 - **Invertebrates: Without backbones**
- **Indicators of Stream Health**
 - **Integrate the impacts of short term environmental variations**
 - **Easy to sample, abundant in most streams**

Benthic Macroinvertebrates

Include larval or nymph forms of:

- Insects
- Crustaceans
- Snails
- Mussels
- Clams
- Worms
- Leeches



Dragonfly
Larvae



Crayfish



Aquatic Snail



Benthic Impairments and TMDLs

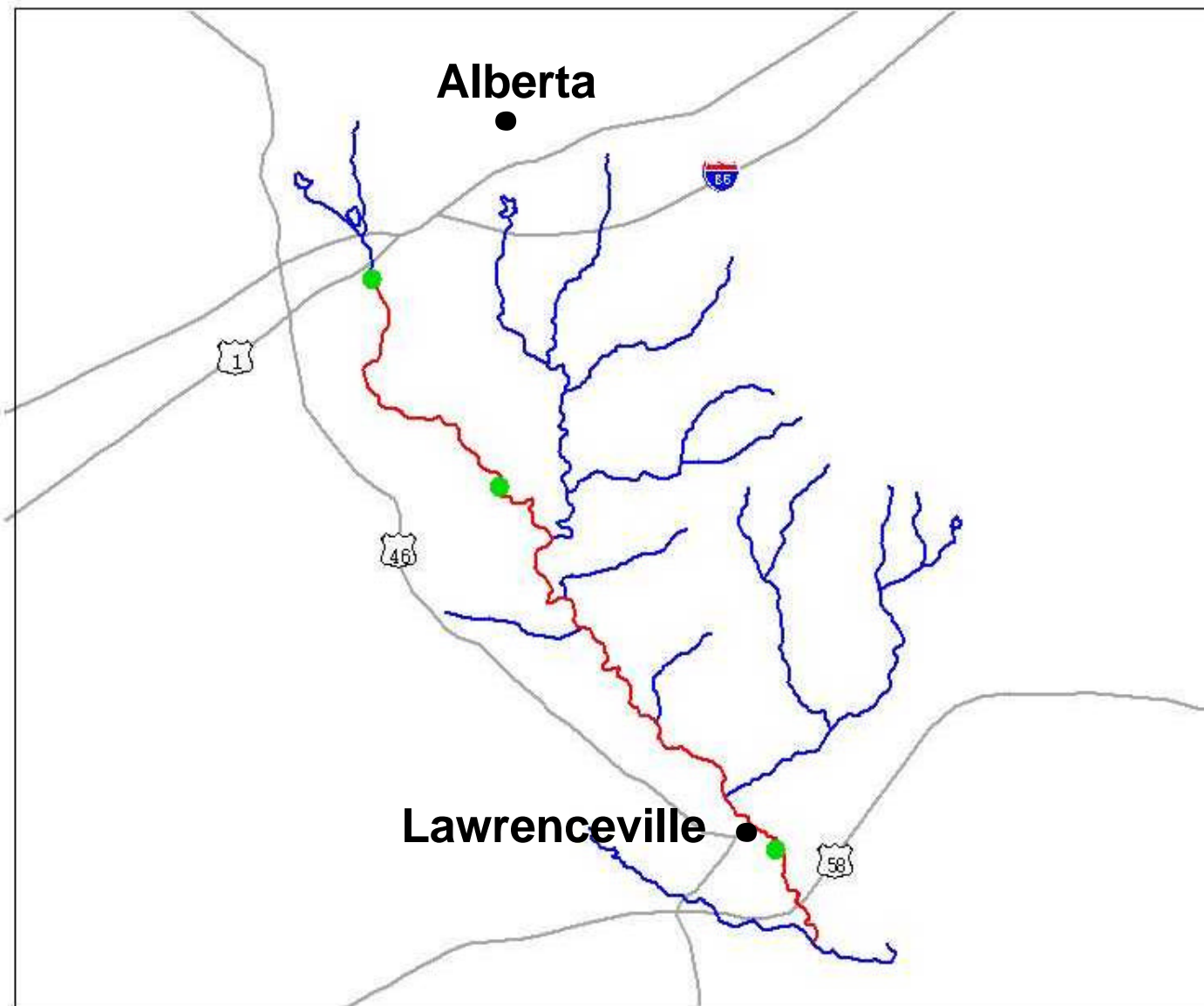
- **After a benthic impairment is identified, more in-depth investigation must be done to identify:**
 - the cause of the impairment, also called the stressor, and
 - the reductions necessary to restore the benthic community, also called the TMDL endpoint
- **The TMDL endpoint is determined by comparing the impaired watershed to a reference watershed**



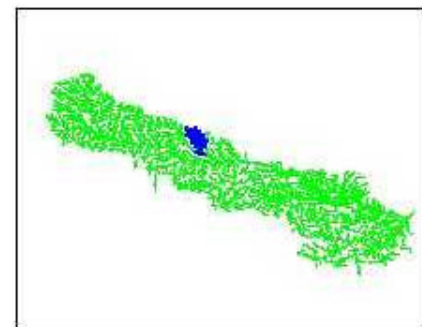
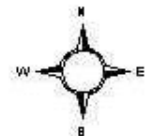
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- **What are the impaired segments?**

Roses Creek



- Monitoring Station
- Impaired Segment
- Roses Creek
- Roads



2 0 2 4 Miles

Impaired Segments

Listed Segment	Cause	Listing Date	Listing Station	# violations / # samples since 1994
Alberta STP discharge - Mouth	FC	1996	5ARSE001.22 @ Rt 678	19 / 41
Alberta STP discharge - Rt 646	BC	1996	5ARSE006.68 @ RT 646	

Info on impaired segments:

• **www.deq.state.va.us/water/303d.html**



Impaired Segment - Fecal Bacteria

- **Initial listing for Fecal bacteria - 1996**
 - **From Alberta STP discharge to confluence with Great Creek**
 - **Listing station 5ARSE001.22 at Rt 678**
- **Continued monitoring resulted in a similar assessment for the 1998 and 2002 reports.**



Impaired Segment - Benthic

- **Initial listing for benthic community - 1996**
 - From Alberta STP discharge to listing station 5ARSE006.68 at Rt 646
 - benthic community immediately upstream of the discharge not impaired - control at 5ARSE009.87
- **Continued monitoring shows significant improvement since 1993**
 - Exception - In 1998 there was a significant decline due to discharger caused degradation.
- **2004 assessment (1998-2002) = (delist??)**



Monitoring Activity - Fecal Bacteria

- **Monthly BST samples (Nov 2002 - Oct 2003)**
 - **5ARSE001.22, Rt 678**
 - **5ARSE006.68, Rt 646**
 - **Fecal Coliform** (MapTech)
 - **E. coli** (MapTech)
 - **Bacteria Source Tracking** (MapTech)



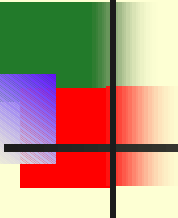
Monitoring Activity - Benthic

- **Current water quality monitoring at 5ARSE006.68, Rt 646**
 - **Field Parameters (D.O., Temp., pH, Conductivity)**
 - **Nutrients and solids (July 2002-June 2003)**
 - **Benthic community (Spring & Fall)**
 - **Diurnal DO monitoring and Toxicity study**



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What can you do as a stakeholder?

- **Get involved!**
 - **Participate in the TMDL process**
 - **Ask questions and make suggestions**
 - **Offer to provide and review local data**
 - **Volunteer for a local watershed advisory committee(s)**
 - **Support efforts to improve water quality in your watershed**

Next Presentation

Technical approach for TMDL Development (Berger-GMU)

this is where you can help...

A photograph of a river or stream in a wooded area. The water is calm and reflects the surrounding trees. A large, fallen tree branch lies across the water in the foreground. The trees are mostly bare, suggesting a late autumn or winter setting. The sky is overcast.

Questions?

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